The Attachment Blink: The Relation Between Adult Attachment and Attention

Honors Research Thesis

Presented in partial fulfillment of the requirements for graduation with honors research distinction in Psychology in the undergraduate colleges of The Ohio State University

by

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June 2011

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Introduction

As anyone who has ever been in a relationship can provide evidence for, there are a wide variety of ways people behave when emotionally connected to another person. Some people are needy; others are aloof. Some fear rejection; others seem indifferent. Some people are absolutely delightful and worth spending a lifetime with; others are nightmarish partners that drive people to change phone numbers and go into hiding. Traditionally, researchers attribute these differences entirely to past experiences (e.g., Hazan & Shaver, 1987; Fraley & Shaver, 2000; Cassidy, 2000). From "the cradle to the grave," people experience relationships and begin to construct an idea of how to interact with those closest to them (Bowlby, 1979, p. 129). These relationship experiences show us how the social world works. But anyone who has ever argued with their partner knows that people can come away from the same relationship experience with different interpretations. There is more to adult romantic attachment than creating a mental how-to guide of relationship behavior. Attention is the gatekeeper of information and can moderate the extent to which stimuli are actually being experienced, and it varies from person to person. Individual differences in attention are actually an underlying feature of the different attachment styles, meaning that attachment is not just a series of learned beliefs, but a cognitive construct closely bound to the different ways people perceive the world. We will review the literature of both adult attachment and attention and show how the two constructs intertwine.

Adult Attachment

Individuals are constantly trying to make sense of the social world around them. Every word uttered, facial expression displayed, and gesture performed is simultaneously encoded and interpreted to create a model of how one is supposed to act with another person and what to

expect from him or her. These "relational schemas" form the basis of attachment theory (Baldwin, 1992). People with different relational schemas, through top-down processing, may interpret the same objective events very differently (Collins, 1996).

Adult attachment theorists distinguish between two distinct dimensions of attachment: avoidance and anxiety (Fraley & Shaver, 2000). Individuals high in attachment avoidance have difficulty becoming emotionally close to a partner and those high in attachment anxiety are consumed with the fear of rejection (Cassidy, 2000). The intersection of these two dimensions creates a space that can be divided into four categories: secure (low avoidance and low anxiety), fearful (high avoidance and high anxiety), preoccupied (low avoidance and high anxiety), and dismissing (high avoidance and low anxiety) (Fraley & Shaver, 2000, see Figure 1). Another way to categorize attachment is secure and insecure, the latter encompassing the fearful, preoccupied, and dismissing categories. Insecurely attached individuals sometimes have difficulty in relationships because of the expectations they derive from their relational schemas of attachment (Collins & Read, 1990). For example, an individual high in attachment anxiety might constantly ask a partner for affirmation of their love, which could be incredibly unappealing to their partner, especially if he or she is high in attachment avoidance. Adult attachment is typically measured with interviews and questionnaires, even though infant attachment, which forms adult attachment's theoretical basis, is measured through standardized observational methods (Crowell, Fraley, & Shaver, 1999; Ainsworth, 1978).

While adult attachment should theoretically be strongly correlated to infant attachment, research has failed to find a very strong correlation between the two (Fraley & Shaver, 2000). This is a currently a major hole in attachment theory. If attachment styles are based on experience, infant attachment *should* contribute to lasting schemas for future attachment

relationships, making attachment style resistant to change (Bretherton & Munholland, 1999). The issue may simply be with the differing methods of measuring attachment between the two groups. After all, adults tend not to become stressed when separated from their parents in an observational setting and infants are not particularly adept with pencil and paper questionnaires. However, if consistent cognitive differences were found in people with different attachment styles, researchers might have a new method that bridges the age gap of attachment. The more deeply attachment can be measured, the more consistently it can be done across the lifetime. Furthermore, understanding cognitive differences in attachment styles will allow attachment-insecurity relationship problems to be addressed in a more thorough and complete manner.

Adult attachment is, by hypothesis, cognitive in nature, because "internal working models" guide how people interact with others and provide insight into what to expect from their attachment partner (Bretherton & Munholland, 1999). Therefore it is unsurprising that measures of attachment relate to several individual differences in cognitive processing. Secure individuals showed more attentional focus in a Stroop interference task, a measure of how difficult it is for an individual to ignore competing stimuli when completing a task, than insecure individuals (Ziejlmans van Emmichoven, van Ijzendoorn, de Ruiter, & Brosschot, 2003). When stressed by being shown a distress-provoking testing room, dismissing and preoccupied individuals are less efficient than secure individuals at processing negative facial emotions, possibly because they "devote significant processing resources to managing their emotional stress" (Niedenthall, Brauer, Robin, & Innes-Ker, 2002). Individuals high on the avoidance scale encode less emotional information from a taped clinical interview than those low in avoidance (Fraley, Garner, & Shaver, 2000). It was also found that the anxiety dimension of attachment is negatively correlated to effortful control over cognitive processes, indicating that individuals

high in anxiety were less capable of focusing and shifting attention (Skowron & Dendy, 2004). Taken together, these studies demonstrate that deep cognitive differences accompany attachment styles.

The Influence of Attention

Studies of cognition suggest there is more to the story of attachment than just objectively different past experiences. People can often experience the same event but interpret the event differently (e.g., Collins, 1996; Jacoby, Allan, Collins, & Larwill, 1988; Jones, 1976; Ellis & Lederman, 1997). This is at least partially because people must choose, selectively and unconsciously, which stimuli to ignore and which information is salient enough to attend to, depending on the task at hand (Bretherton & Munholland, 1999). Cognitive differences may color objective experiences of romantic relationships through this top-down processing. In other words, people do not just sense every single stimulus around them and algorithmically add it all together as a new experience. Instead, their attention guides them to what pieces of information are the most important.

If attachment styles are indeed formed by repeated experiences within social contexts, then cognitive differences in attention should influence the subjective perception of that relationship experience, coloring the formation of the attachment styles. Attention moderates the information that an individual will actually sense, perceive, and ultimately fold into the schema (Luck & Ford, 1998). The brain's ability to do this requires attentional resources: the processing capacity necessary to allocate thought to external stimuli. Attentional resources are limited, so each person must be able to spend them on the task that is perceived as the most important or salient (Wickens, 1980). The ways in which people spend their attentional resources vary,

undoubtedly influencing how they perceive the world. For instance, people with high state-anxiety take longer to disengage their attention from negative-emotion faces (Fox, Russo, Bowles, & Dutton, 2001). But there are two possible lines of causality between attention and attachment which are incredibly difficult to tease apart. One possibility is that cognitive individual differences (potentially genetic) direct attention to varying stimuli in relationship experiences that build relational schemas, while another is that those relational schemas direct attention to relationship information consistent with the schema. It is also quite possible that attention and attachment influence one another in a dual causality. The present study intends to merely show the link between the constructs of adult attachment and attention, not suggest the direction of causality in the relationship. In any event, cognitive differences in attention do influence how reality is perceived.

The attentional blink phenomenon is one method of measuring the limits of an individual's attentional resources (Raymond, Shapiro, & Arnell, 1992). If an individual is spending attentional resources on one stimulus, he or she will sometimes miss, or "blink" during, an immediately subsequent stimulus because they are distracted by the first stimulus. Chun & Potter (1995) determined that when participants looked for two targets in a rapid serial visual presentation (RSVP) stream, the participants had a particularly difficult time finding the second target when it was presented after the first by between 200 and 500 ms, after which time attentional resources were regained. Furthermore, the more difficult the first target was to process, the more likely the individual was to exhibit an attentional blink (Chun & Potter, 1995). When participants spend their attentional resources on processing the first target, they have fewer resources for finding the second target. It takes time to regain attentional resources.

Attention absorbing stimuli vary continuously on the dimension of emotional valence (Lang, Bradley, & Cuthbert, 2008). Increasing emotional valence in either direction (more positive or more negative) causes a to stimulus draw more attentional resources. The attentional blink occurs for a single target in an RSVP stream if a negatively valenced distractor appears 200 ms (called the "lag 2" condition) before the target (Most, Chun, Widders, & Zald, 2005). The effect was not as pronounced with neutral distractors or when the distractor appears 800 ms (called "lag 8") before the target. Several studies have shown that the ability to detect the target returns to full capacity anytime after 500 ms, making a comparison of the lag 2 and lag 8 appropriate for determining the degree of the attentional blink (Most *et al.*, 2005; Most, Smith, Cooter, Levi, & Zald, 2007; Smith, Most, Newsome, & Zald, 2006). If participants receive a very specific description of the target (i.e. "look for the picture of a rotated building" instead of "look for a rotated picture"), the degree of attentional blink they experience is correlated to the individuals' scores on a harm avoidance questionnaire (Most *et al*., 2005). The anxious, harm-avoiding individuals spent more of their attentional resources on the negative distractor than did less harm avoidant individuals, even though their task was completely unrelated to the distractor.

Some images selected for Most and colleagues' study showed people in danger in order to elicit an effect from individuals with more harm-avoiding tendencies. If the distractor pictures were more tailored to the anxieties of a particular group of individuals, the effect should be greater. What if pictures of spiders were used in an RSVP stream? A person with arachnophobia should spend more attentional resources on that image than a person who doesn't mind the eight legged insectivores. This is in fact the case (Trippe, Hewig, Heydel, Hecht, & Miltner, 2007). If an individual fears, or at least thinks a lot about, being rejected by a romantic partner or getting

emotionally close to a partner, then negative social stimuli should have a similar blink-inducing effect.

The present study will use the attentional blink paradigm to determine if negative pictures depicting socially interacting people will draw and hold the attention of insecurely attached individuals more than securely attached individuals. High anxiety individuals become "increasingly vigilant" when presented with attachment-related stimuli and then subsequently dwell longer on negative social cues than securely attached individuals (Fraley & Shaver, 2000; Niedenthall *et al*., 2002). When they see the negative, social distractor in the RSVP, we predict they will attend more to the distractor than a less anxious individual and therefore have lower accuracy in detecting the target at lag 2 compared to lag 8, when attentional resources will recover. Adults high on the avoidance dimension encode less emotional social information than secure adults (Fraley *et al.*, 2000). They disengage from emotional situations to reduce any unpleasant feelings they have about attachment relationships (Fraley & Shaver, 2000). They will use up cognitive resources to ignore the emotional social picture and therefore will not be as affected when the target is presented immediately after the distractor at lag 2. However, the cognitive resources used to avoid the distractor may begin to run out after a longer period of time. Avoidant individuals may experience an uncharacteristic attentional blink later in the RSVP at lag 8. Just as the picture of a spider is more emotionally salient to a person with arachnophobia, a picture of a man attacking a woman or three sad teenagers comforting one another should be more emotionally salient to someone with high attachment anxiety, but may cause those high in avoidance to focus intensely on the target-finding task until the thought suppression has consumed available cognitive resources.

Research on the attentional blink has not, to our knowledge, focused on how the degree of the distractor's arousal affects the attentional blink. The International Affective Picture Scale (IAPS) was designed to experimentally control for the valence and arousal of visual stimuli (Lang *et al.*, 2008). The set contains thousands of pictures, each rated by hundreds of people on how aroused and negative or positive the pictures make them feel. There is a parabolic relationship between valence and arousal in these pictures; the less neutral the valence (in either the positive or negative direction) of the picture, the more arousing it tends to be viewed (Lang, 1995). The present study will not only examine the attentional blink in the context of attachment, but also the degree to which the attentional blink occurs as a function of arousal.

Many researchers claim that the internal working models of attachment influence what an individual experiences "on an automatic level" (Zeijlmans van Emmichoven *et al*., 2003). In this study, we aim to show that attention is one of the cognitive reasons for this automaticity, that there are entrenched attentional differences between people with different attachment styles. More specifically, we expect an interaction between attachment styles, arousal, and time between distractor and target (lag 2 vs. lag 8). We hypothesize that individuals with high attachment anxiety, those with preoccupied and fearful attachment styles, will have lower accuracies than less anxious individuals in finding the target picture when more highly arousing, negative social stimuli are presented specifically at lag 2 and that those with high attachment avoidance, individuals with fearful and dismissing attachment styles, will have lower accuracies than less avoidant individuals when more highly arousing negative social stimuli are presented at lag 8 due to less efficient processing of social information. We also intend to replicate Most and colleagues' (2005) finding that participants are more distracted by emotional distractor pictures presented at lag 2 than at lag 8, and to expand these findings to show that the more arousing the

distractor picture, according to the heavily standardized IAPS scale, the more distracted individuals will be when it is presented at lag 2.

Method

Participants

For Study 1, 112 students (55.4% male) of varying racial backgrounds (84 white, 13 Asian, 6 African American, 2 reporting multiple races, and 1 American Indian) at the Ohio State University were recruited through the Research Experience Program. In return for their participation they received partial credit towards the completion of an introductory psychology course. The median age of the sample was 19.0 years (range = 18.0 – 29.5 years). The sample was predominantly right handed (88.4%). Thirteen participants were excluded for being significantly less accurate than chance on the computer task, suggesting they had misinterpreted key-pressing instructions, leaving 99 participants.

Materials

The Experiences in Close Relationships Questionnaire. (ECR; Brennan, Clark, & Shaver, 1998). The ECR consists of two independent, alternating, eighteen-item scales of relationship avoidance and relationship anxiety. Participants respond on a 7-point Likert scale ranging from “disagree strongly” to “agree strongly.” Responses can be coded along the two dimensions of adult attachment or be used to report one of four attachment styles for each individual. Individuals low in anxiety and avoidance are in the secure group and those high on both scales are in the fearful attachment group. High anxiety and low avoidance scores define the preoccupied group and low anxiety and high avoidance scores define the dismissing group. The

ECR has been used repeatedly in previous studies to determine anxiety and avoidance scales or by categorizing individuals' attachment styles (Fraley *et al.*, 2000; Niedenthall *et al.*, 2002; Quirin *et al.*, 2010; Skowron & Dendy, 2004).

Stimuli for computer task. There were three categories of picture stimuli for the computer task: targets, distractors, and backgrounds. There were twenty-four possible targets, images of buildings rotated ninety degrees, (twelve rotated to the left and twelve to the right). There were 360 background pictures of upright landscapes or buildings. Both the targets and the backgrounds were selected from publically available sources.

Eighteen distractor pictures were selected from the International Affective Picture Scale (IAPS) (Lang, Bradley, & Cuthbert, 2008). They all contained two or more socially interacting individuals (i.e. a group of women crying or a man holding a gun to a boy's head) and were negatively valenced (below a rating of 5 on a 1-9 scale) according to the IAPS rating system. Potential distractor pictures were excluded on the basis of having a portrait (vertical) orientation, ambiguous meanings, poor quality, inclusion of animals, depicting subjects off-center, or included people that were lying down, as it might distract from the task of finding a rotated picture more so than a picture of upright individuals. The nine-point IAPS arousal scale was used to divide distracters into high (arousal rating greater than or equal to 5.5), medium (rating between 4.5 and 5.5), and low (ratings less than or equal to 4.5) arousal conditions. The remaining distractors selected were examined in Adobe Photoshop CS4 in order to compare the brightness of the pictures using the mean luminance value of the histogram function (High, $M = 107.5$, $SD = 35.1$; Medium, $M = 107.9$, $SD = 34.5$; Low, $M = 105.8$, $SD = 18.5$). Some pictures were replaced to equate each group on the luminance scale. Six pictures were ultimately selected for each distractor group which varied in arousal (High, $M = 6.837$, $SD = 0.244$; Medium, $M =$

4.927, SD = 0.368; Low, *M = 4.043, SD = 0.252*). No effort was made to control the valence of each group (as long as they were negative) because as IAPS pictures become more arousing, they also are rated more extremely for valence (Bradley & Lang, 2007).

The presentation and counterbalancing of all stimuli was implemented by DirectRT software.

Procedure

Students were brought into a computer lab in groups of six to fourteen. They were seated so that each participant was either facing a wall or otherwise not directly across from another participant, so that no one would be able to see another participant's face during the experiment. Participants were instructed to complete the ECR before continuing on to the computer task instructions. The survey was given before the computer task to prime individuals to think about their own romantic attachment tendencies, increasing the likelihood that the attachment differences would show up in the attentional task.

After all participants had completed the questionnaire, they were given instructions for the computer task. They were instructed that that their task was to find the picture of a rotated building, the target, within an RSVP of pictures and then indicate which direction the target was rotated. They were explicitly told to ignore all other pictures. Participants would see a fixation stimulus on the screen before each trial and were instructed to press the space bar in order to start each RSVP. Each of the seventeen pictures in the RSVP was displayed for 100 ms (see Figure 2). The RSVPs were composed of fifteen background pictures, one target picture, and one distractor picture. The distractor picture always preceded the target picture. At the end of each RSVP, the participant indicated the direction the target was rotated by pressing "Q" for left and

"P" for right on a standard keyboard, or pressed the space bar if they did not see the target. The individual background, target, and distractor pictures were randomly selected for each trial. The next fixation stimulus was presented after the participant responded.

The distractor was presented 300, 500, or 700 ms after the participant began the trial (onset times) and preceded the target picture by either 200 ms or 800 ms (lag 2 or lag 8). Previous research has shown that in the lag 2 condition, overall accuracy will decrease, as individuals will spend their attention on the distracting picture, but recover their attentional resources during the lag 8 condition to have higher accuracy in detecting a target (Most, Chun, Widders, & Zald, 2005). Therefore, lag 2 trials are the test condition and the lag 8 trials will be treated as a control condition. The remaining fifteen pictures in each RSVP were background pictures randomly selected from the pool of 360 by the DirectRT software for each trial. Counterbalancing of the experimental variables was controlled by the DirectRT software.

Each participant began with 16 practice trials that did not include a distractor picture and then proceeded to 144 experimental trials. These trials had four variables: distractor onset (300, 500, or 700 ms), time interval between the distractor and target picture (200 or 800 ms) or "lag" (2 or 8), rotation direction (left or right) and level of arousal for the distractor (high, medium, or low) creating 36 possible combinations, repeated in four blocks to make 144 total trials. Trial order was randomized by the DirectRT software.

Results

Replication of Most *et al*. (2005)

The key dependent variable was the accuracy of the participants, coded binomially as either a correct response or an incorrect response. The lower the estimated mean accuracy, the

greater the degree of the attentional blink. Across all trials and participants, the estimated mean accuracy was 0.85 (*SD = 0.36*), so the task was at least somewhat challenging.

The first objective of the analysis was to demonstrate that the attentional blink paradigm actually worked. In other words, were participants less accurate when a distractor picture was presented 200 ms before the target than if it was presented 800 ms before the target? In order to assess the effects of the manipulated variables on task accuracy in this task, a mixed model ANOVA was run with lag (2 vs. 8), arousal of distractor (low vs. medium vs. high), onset of distractor (300 vs. 500 vs. 700 ms), and gender. Participants had a harder time finding the target in the lag 2 condition (*M = 0.810, SE = 0.011*) than in the lag 8 condition (*M = 0.887, SE = 0.011*). This is consistent with previous findings on the attentional blink. There was a significant main effect of lag (*F(1, 14127) = 176.60, p < 0.001,* see Figure 3).

We next wanted to expand these findings by showing that the task accuracy decreases when the distractor is more arousing and that the arousal of the distractor will interact with lag so that task accuracy will only decrease with higher arousal in the lag 2 condition. An increase in the level of arousal did seem to decrease task accuracy (low arousal, *M = 0.864, SE = 0.011*; medium, *M = 0.847, SE = 0.011*; high, *M = 0.835, SE = 0.011*), and there was a main effect of arousal on accuracy (*F(2, 14127) = 8.35, p < 0.001*, see Figure 4). Furthermore, there was an interaction between lag and arousal (*F(2, 14127) = 5.56, p = 0.004*) in the expected pattern (see Figure 5).

A few other results appeared in the ANOVA that we had not explicitly predicted. The earlier the onset of the distractor (and therefore, the earlier the target was presented), the more likely participants were to miss the target (300 ms, *M = 0.835, SD = 0.011*; 500, *M = 0.844, SE = 0.011*; 700, *M = 0.866, SE = 0.011*). There was a main effect of onset (*F(2, 14127) = 9.95, p*

< 0.001) and an interaction between onset and lag (*F(2, 14127) = 3.26, p = 0.038*), likely due to the fact that the combination of these two variables determined how soon in the RSVP the target actually appeared (e.g., an RSVP in the lag 2, 500 ms condition would have a target that was the eighth picture in the stream). There was no main effect of gender on task accuracy (*F(1, 14127) = 0.776, p = 0.381*), though gender did interact with both lag (*F(2, 14127) = 4.250, p = 0.039*) and arousal (*F(2, 14127) = 3.172, p = 0.042*), so it was included in subsequent analyses.

Dimensional Analysis of Attachment

Once the aforementioned analysis verified that the assembled paradigm validly tests documented attention tendencies, the next step was to demonstrate that some variance in task accuracy could be explained by individual differences in adult attachment. Because the field of adult attachment currently prefers the view of attachment as the intersection between the dimensions of anxiety and avoidance, this was the first direction for analysis of the present study (Fraley & Shaver, 2000).

ECR anxiety (*M = 3.58, SD = 1.00*) was therefore added as a covariate to the original mixed model ANOVA with lag, arousal, onset, and gender to determine if individuals with higher scores on the anxiety dimension of attachment perform worse at the task than those with lower scores, specifically with highly arousing distractors in the lag 2 condition. Contrary to the hypothesis, there were no effects of ECR anxiety on accuracy in this model (*F(1, 95) = 0.011, p = 0.918*). In fact, only lag remained significant when ECR anxiety was introduced as a covariate (*F(1, 14109) = 5.39, p = 0.020*). Even when gender, onset, and arousal were removed from the model, there was no effect of ECR anxiety on accuracy (*F(1, 97) = 0.003, p = 0.959*) and predicted interaction with lag did not materialize (*F(1, 14155) = 2.25, p = 0.133*).

The next step was to return to the original mixed model ANOVA and use ECR avoidance (*M = 2.79, SD = 1.02*) as a covariate to investigate the hypothesis that highly avoidant individuals perform worse at the attentional task than less avoidant individuals, specifically with highly arousing distractors in the lag 8 condition. The data did trend in this direction (correlation between ECR avoidance and accuracy: *r = -0.054, p < 0.001*), though there was not a significant main effect of ECR avoidance in the model (*F(1, 95) = 2.35, p = 0.129*), and it only trended towards significance in its interaction with lag (*F(1, 14109) = 2.25, p = 0.134*). Gender and arousal did not have a main effect on accuracy in this model and did not interact significantly with any other variable either, so they were removed from a subsequent model. This mixed model ANOVA (with lag and onset with covariate ECR avoidance) found a borderline significant main effect of ECR avoidance (*F(1, 97) = 3.88, p = 0.052*) and a potential interaction between ECR avoidance and lag (*F(1, 14147) = 2.90, p = 0.088*). The more avoidant the individual, the lower their overall accuracy, and this effect was further mediated by lag, such that the correlation between ECR avoidance and accuracy was more pronounced at lag 8 (*r = -0.077, p < 0.001*) than at lag 2 (*r = -0.037, p = 0.002*), as predicted.

Categorical Analysis of Attachment

If anxiety and avoidance were truly separate dimensions, this would be the end of the story. But the clear absence of an effect of anxiety on attention in the previous analyses, coupled with the possibility that the two dimensions may interact, begged for further investigation. The ECR dimensions can be mathematically converted into the four attachment styles (Brennan *et al.*, 1998). The participants in this study were classified as thirty-two secure, twenty-four fearful, thirty-two preoccupied, and eleven dismissing.

The next step in the data analysis was to categorically compare the secure group of individuals to each of the insecure groups of individuals separately to further investigate our hypotheses regarding individual differences in attention. To directly test the hypothesis that insecure individuals have less efficient attentional tendencies than secure individuals, ECR attachment style was added as a variable to the original mixed model ANOVA. For parsimony, each insecure attachment style was compared to the secure attachment style separately.

Secure vs. Preoccupied. The initial hypothesis suggested that the high anxiety preoccupied individuals would exhibit a greater attentional blink, i.e. be more profoundly affected by highly arousing distractors at lag 2 than secure individuals. This hypothesis was not confirmed, as in the mixed model ANOVA of lag, onset, gender, arousal, and attachment style including only secure and preoccupied individuals, there was no effect of attachment style on accuracy ($F(1, 60) = 2.07$, $p = 0.155$) and no interaction of attachment style with any other variable, even though the main effects of the other variables carried over from the original analysis. It is impossible to distinguish the attentional patterns of secure and preoccupied individuals in this task. Because the main difference between these two groups is a higher attachment anxiety in the preoccupied group, these results mirror the findings of the dimensional analysis.

Secure vs. Dismissing. The original hypothesis was that secure individuals would have higher accuracies than dismissing individuals with highly arousing distractors in the lag 8 condition. Secure and dismissing individuals differed slightly in overall accuracy (secure, $M = 0.871$, $SE = 0.014$; dismissing, $M = 0.843$, $SE = 0.024$), though the mixed model ANOVA did not yield a main effect of attachment style ($F(1, 39) = 1.08$, $p = 0.304$). However, there was a trending interaction of arousal and attachment style ($F(2, 6101) = 2.62$, $p = 0.073$) and a

significant interaction of lag, arousal, and attachment style between these two groups (*F(2, 6101) = 4.91, p = 0.007*, see Figure 6). Secure individuals only had lower task accuracy when the distractor was highly arousing at lag 2, but the dismissing individuals were distracted equally by low and high arousal distractors at lag 2. Furthermore, it appears that dismissing individuals lose accuracy as the distractor becomes more arousing at lag 8, while secure individuals are unaffected by arousal at lag 8. Arousal only influenced task accuracy amongst secure participants at lag 2, but arousal only influenced task accuracy amongst dismissing participants' attention at lag 8, which is in line with the original prediction.

Secure vs. Fearful. Fearful individuals, who are high in both anxiety and avoidance, should have lower accuracy than secure individuals for high arousal distractors in both the lag 2 and lag 8 conditions according to the original hypothesis. Secure and fearful individuals differed slightly in overall accuracy (secure, *M = 0.871, SE = 0.018*; fearful, *M = 0.843, SE = 0.023*). Gender did not have a main effect nor did it interact with other variables in this mixed model ANOVA and was therefore removed. But the mixed model ANOVA did not quite yield a main effect of attachment style (*F(1, 54) = 2.11, p = 0.152*). There was not the predicted interaction between lag, arousal, and attachment style (*F(2, 7978) = 0.973, p = 0.378*). However, between these secure and fearful groups, there was an interesting interaction trend that did not appear anywhere else in our analysis of attachment: one between arousal, attachment style, and *onset* (*F(2, 7960) = 2.486, p = 0.083*). The best way to summarize this possible interaction is that secure individuals were more able to use later onset to their advantage in detecting the target, while fearful individuals were not able to do so, particularly when the distractor was more arousing (see Figure 7). Both fearful and dismissing individuals are more avoidant than secure

individuals, but it appears to manifest itself differently in this attention-based task, potentially because avoidance and attention interact differently in the context of high anxiety.

Discussion

Individuals with different attachment styles performed differently in the attentional blink paradigm with negative, arousing pictures depicting social interactions. We were also able to replicate and expand on previous research on the attentional blink. Individuals were far less accurate at detecting a target presented 200 ms after an emotional distractor compared to 800 ms after. Furthermore, the more arousing the distractor, the harder it was for participants to avoid the attentional blink, shown by the interaction between arousal and lag. The greatest attentional blink occurred at lag 2 with the most arousing distractors, in line with our initial hypothesis.

Contrary to the original hypothesis, attachment anxiety had no significant effect on accuracy in the attention-based task. Attachment avoidance, on the other hand, did seem to decrease task accuracy. The more avoidant the individual, the lower their accuracy in finding the target, specifically at lag 8, while less avoidant individuals were able to recuperate attentional resources in this condition, as predicted. When attachment was examined categorically, the secure group, as predicted, had the highest accuracy across all conditions, though the differences were generally not significant. The dismissing group may not have performed worse than the secure group at the task overall, but they were distracted equally by highly arousing distractors and less arousing distractors presented directly before the target at lag 2, while the secure group only had lower accuracy at lag 2 when the distractor was highly arousing. Broadly speaking, avoidant individuals were more distracted by socially emotional distractors than secure individuals.

Attachment anxiety did not seem to influence the attentional blink as predicted, neither dimensionally nor categorically. But the fact that fearful and dismissing individuals were unique in how their attentional tendencies differed from secure individuals leaves hope for the hypothetical connection between attachment anxiety and attention. Both groups are highly avoidant, which is apparently linked to attention, but still their attentional deficits in the attentional blink task have a distinctly different flavor from one another, a difference that might be moderated by the presence of high attachment anxiety in the fearful group.

The most interesting trends arose in the interactions between attachment style, lag, onset, and arousal in the categorical comparison of secure/dismissing individuals and secure/fearful individuals. The dismissing group was unique in that they were not any worse at detecting a highly arousing distractor presented directly before the target than a less arousing one at lag 2, but instead at lag 8. For secure, fearful, and preoccupied individuals, task accuracy decreased the most when the distractor was highly arousing and presented right before the target. The threshold of arousal necessary to elicit the attentional blink may be lower for dismissing individuals. Based on previous evidence that dismissing individuals attend less to social information, this group might be avoiding sensory stimulation (Jerome & Liss, 2005). *Any* negative, social stimulus (all of the distractors in this task) initiates a thought suppressing avoidance mechanism, even if it isn't particularly arousing. But thought suppression is rarely successful; in fact it paradoxically consumes cognitive resources (Wegner, Schneider, Carter, & White, 1987). Therefore, while dismissing individuals implicitly attempt to ignore the social pictures, they direct attentional resources away from the target-finding task, causing them to miss the target. The decrease in lag 8 accuracy as a function of distractor arousal for more avoidant individuals may exist because this avoidance mechanism consumes attentional resources more persistently than if the

individual was merely trying to disengage attention from the distractor, which is thought to be why highly anxious individuals seem to have such an inability to disengage from the negative, arousing stimulus (Fox *et al.,* 2001). This budding evidence intimates that individuals with different attachment styles utilize fundamentally different cognitive processes when confronted with social stimuli.

Fearful individuals were not able to improve their attentional focus with a later onset of the distractor as secure individuals did. With high levels of both anxiety and avoidance, fearful individuals should be the most cognitively deregulated attachment style. One possible explanation for the main effect of onset is that initiating the task requires some cognitive resources, so that as the task goes on, the participant should be increasingly prepared to see the target. Secure individuals showed more and more attentional resources as the task went on, no matter how arousing the distractor. But fearful individuals don't use the extra time to focus their attentional resources on the task, especially if the distractor is highly arousing, derailing the focusing mechanism benefiting from later onsets. This is consistent with the research on deregulation of attention in highly anxious individuals, though we only found this within the highly anxious individuals who were also highly avoidant (Skowron & Dendy, 2004).

There is much debate in the attachment literature over whether dimensional or categorical frameworks are more appropriate to explain attachment phenomena (e.g., Fraley & Spieker, 2003; Sroufe, 2003). The anxiety and avoidance dimensions might be useful to conceptualize the beliefs related to attachment, but this study found that fearful individuals, high in both anxiety and avoidance, varied uniquely from secure individuals in a way that individuals high on only one dimension did not. In this attentional task, being highly avoidant meant something different in the context of high anxiety, suggesting that some interaction between the two dimensions

makes the four attachment styles more complicated than just combinations of high or low anxiety and avoidance. The deep, cognitive differences appear not simply in a two-dimensional space, but between attachment styles in the attentional blink paradigm, providing some justification for conceptualizing adult attachment categorically.

This study displays the cognitive differences between individuals with different attachment styles, differences that can be seen in the time frame of hundreds of milliseconds and in a task with distracting stimuli only loosely related to attachment. Only a few of the pictures depicted what might be considered to be a typical romantic adult-attachment interaction, instead containing acts of non-domestic violence, shared sadness between friends, or people in a frightening situations. Still, people with different attachment styles performed differently in the task, showing a different pattern of estimated mean accuracies across conditions. Adding this evidence to a collection of other recent findings, it is not surprising that adult attachment styles are more than just a series of beliefs, nor is it unexpected that attention plays a role in how people perceive social cues.

There are several limitations to this study. The first is the lack of a neutral distractor condition. Previous studies have included neutral conditions to prove that the arousal of the pictures is causing the main effect, though these findings cannot necessarily be generalized to our study (Most *et al.*, 2005; Most *et al.*, 2007). Including nonsocial or positively-valenced distractors might also strengthen these findings. It is important to elucidate the specificity of these attentional differences by determining if the individual differences in attention between attachment styles disappear or change when the distractor is less related to the attachment-domain or less threatening. This cognitive task is inherently efficient to implement, considering each RSVP is less than 2 seconds long, so future studies addressing these issues can be designed

relatively easily to further investigate the interaction between the attentional blink task and adult attachment style.

Ultimately, there remains the issue of causation. Do previous attachment experiences form relational schemas that influence what individuals attend to in a matter of milliseconds or do individuals with different attachment styles have genetic differences that predispose them to attend to negative, social information? This study does not attempt to answer the question, though its theoretical importance should not be ignored as future studies are designed to examine the relation between attention and attachment.

One of the major gaps in attachment theory is the disparity between the methods of measuring adult attachment and infant attachment, two constructs that should theoretically be closely related. If there are deep, cognitive differences in how people process social information that are related to their attachment styles, then this may be a mechanism with which to bring attachment into a tighter, developmental continuum. While this study would obviously not be suited for an infant, several procedures have been implemented to assess cognitive functioning in infants, including eye-tracking techniques and habituation methods (see Olson & Dweck, 2009). Such methods could be utilized to test the same individual differences in disengagement from negative social stimuli studied in the attentional blink paradigm (Johnson & Chen, 2011).

There is no doubt that experience plays a significant role in attachment. People learn from interactions with parents, friends, and significant others throughout the lifetime to form a model of what “mom,” “best friend,” and “lover” are supposed to mean. But in order to build that model, they must perceive social stimuli, inevitably influenced by deep, attentional differences. People with different attentional tendencies may experience the same events and end up with a different idea of how to act in and what to expect from a relationship. The massive

structure of attachment guides our relationship experiences, but its story is incomplete without the instructions on how it was built.

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Figure Captions

Figure 1. The adult attachment space (adopted from Fraley & Shaver, 2000).

Figure 2. A pictorial representation of the rapid serial visual presentation (RSVP), containing one distractor, one rotated target, and fifteen background pictures. Each RSVP varies by lag between distractor and target, onset of the distractor, arousal of the distractor, and rotation of the target.

Figure 3. Main effect of lag on task accuracy ($F(1, 14127) = 176.60, p < 0.001$).

Figure 4. Main effect of arousal on task accuracy $(F(2, 14127) = 8.35, p < 0.001)$.

Figure 5. Interaction between lag and arousal ($F(2, 14127) = 5.56, p = 0.004$).

Figure 6. Comparison of secure and dismissing individuals in an interaction between lag, arousal, and attachment style ($F(2, 6101) = 4.91, p = 0.007$).

Figure 7. Comparison of secure and fearful individuals in an interaction between lag, onset, and attachment style (Gender excluded from the model, $F(2, 7960) = 2.49, p = 0.083$).

Figure 1

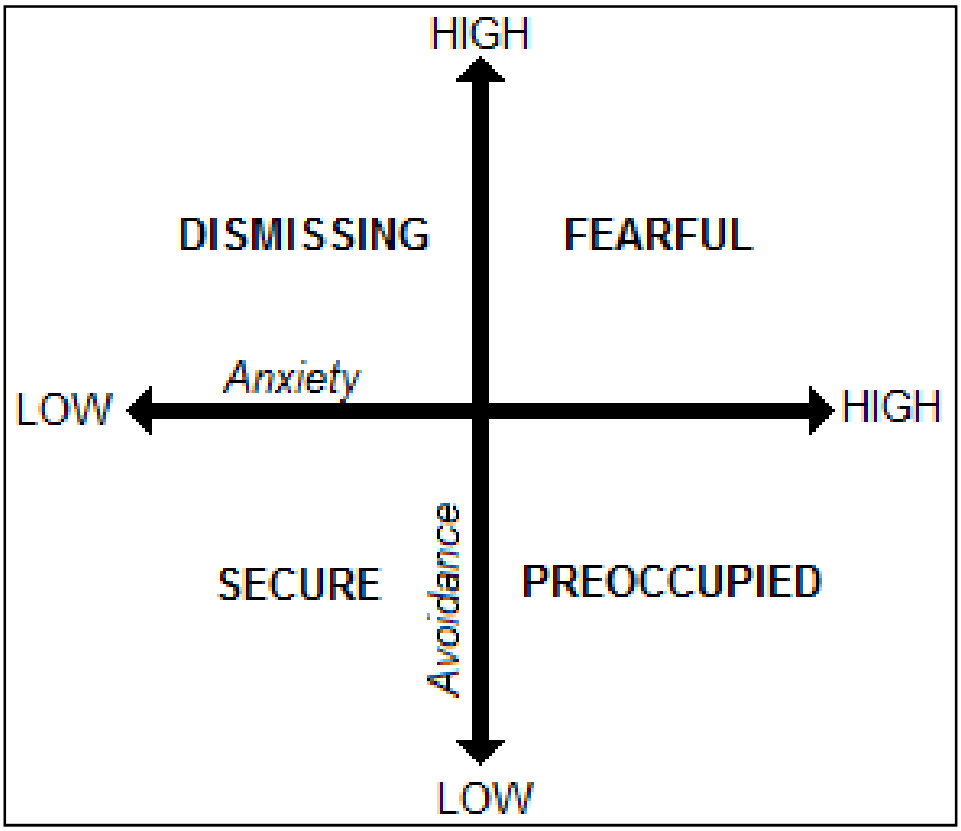

HIGH
DISMISSING
FEARFUL
Anxiety
LOW
HIGH
SECURE
Avoidance
PREOCCUPIED
LOW

Figure 2

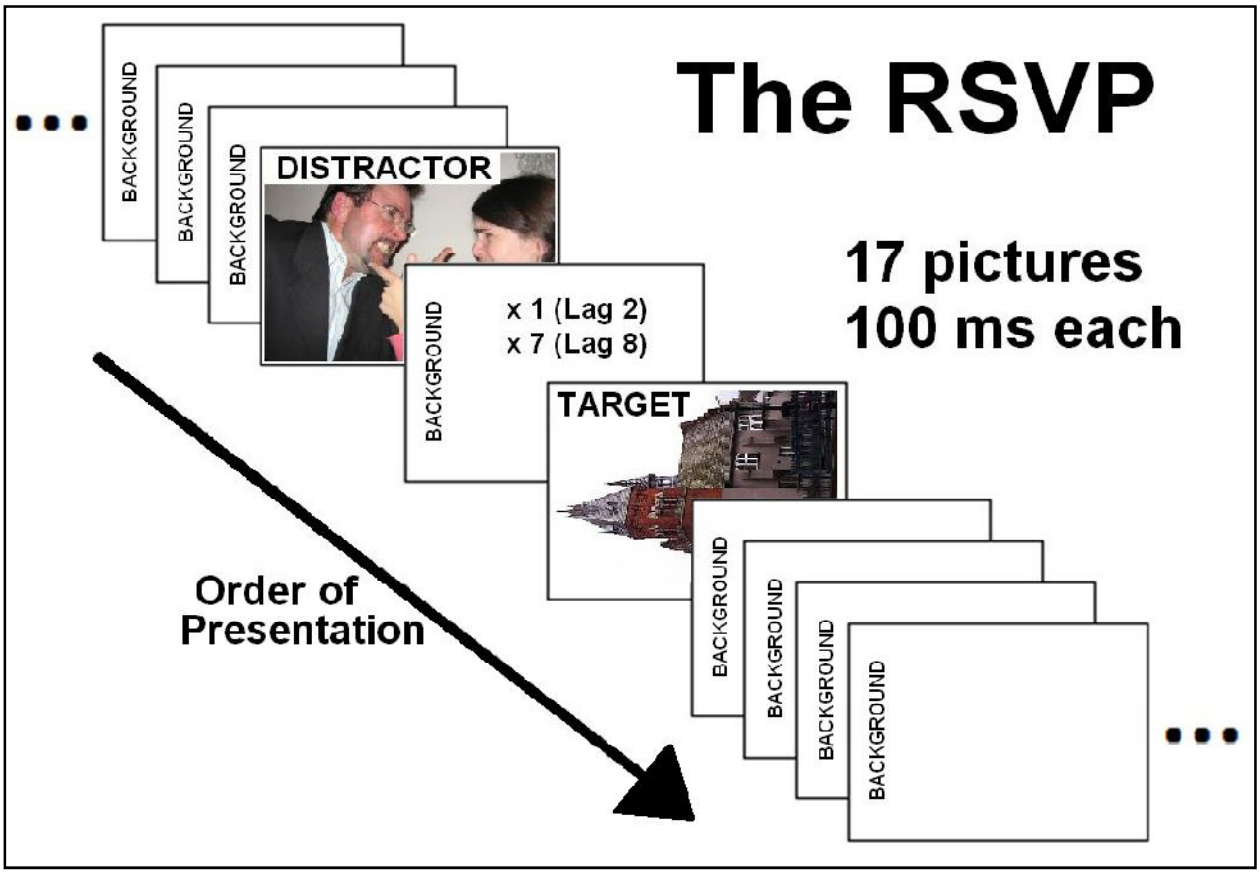

The RSVP
17 pictures
100 ms each
BACKGROUND
BACKGROUND
BACKGROUND
DISTRACTOR
x 1 (Lag 2)
x 7 (Lag 8)
BACKGROUND
TARGET
BACKGROUND
BACKGROUND
BACKGROUND
BACKGROUND
Order of Presentation

Figure 3

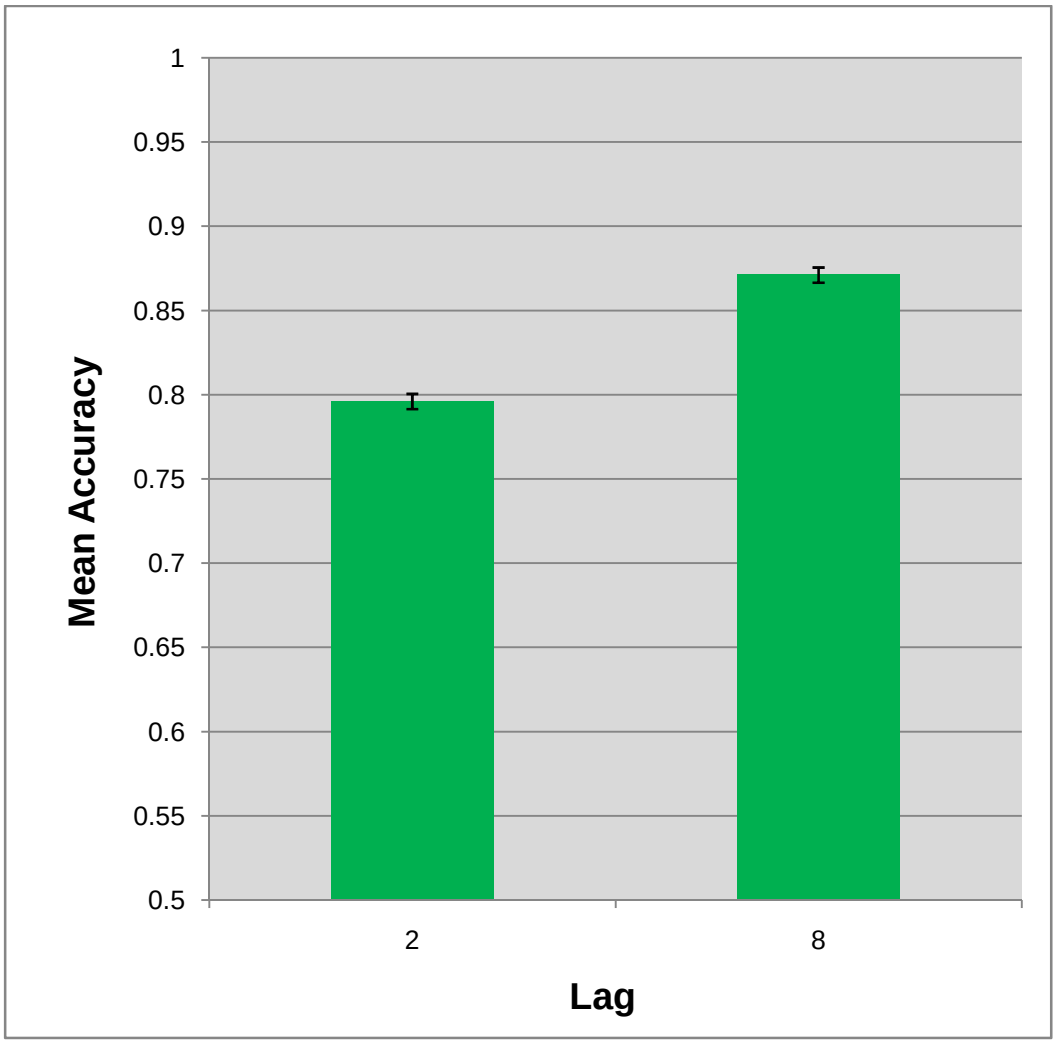


Figure 4

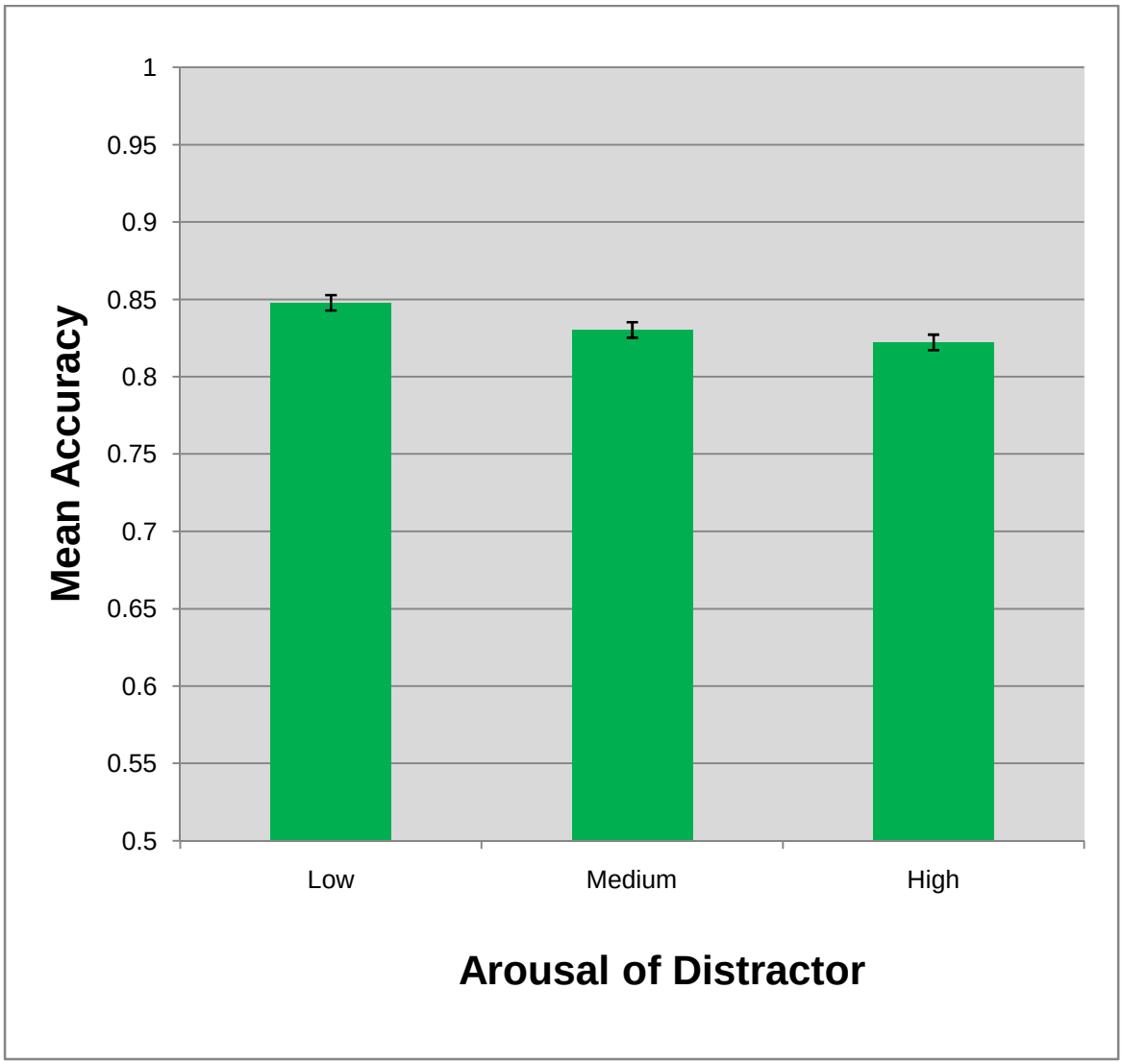

1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0.55
0.5
Mean Accuracy
Low
Medium
High
Arousal of Distractor

Figure 5

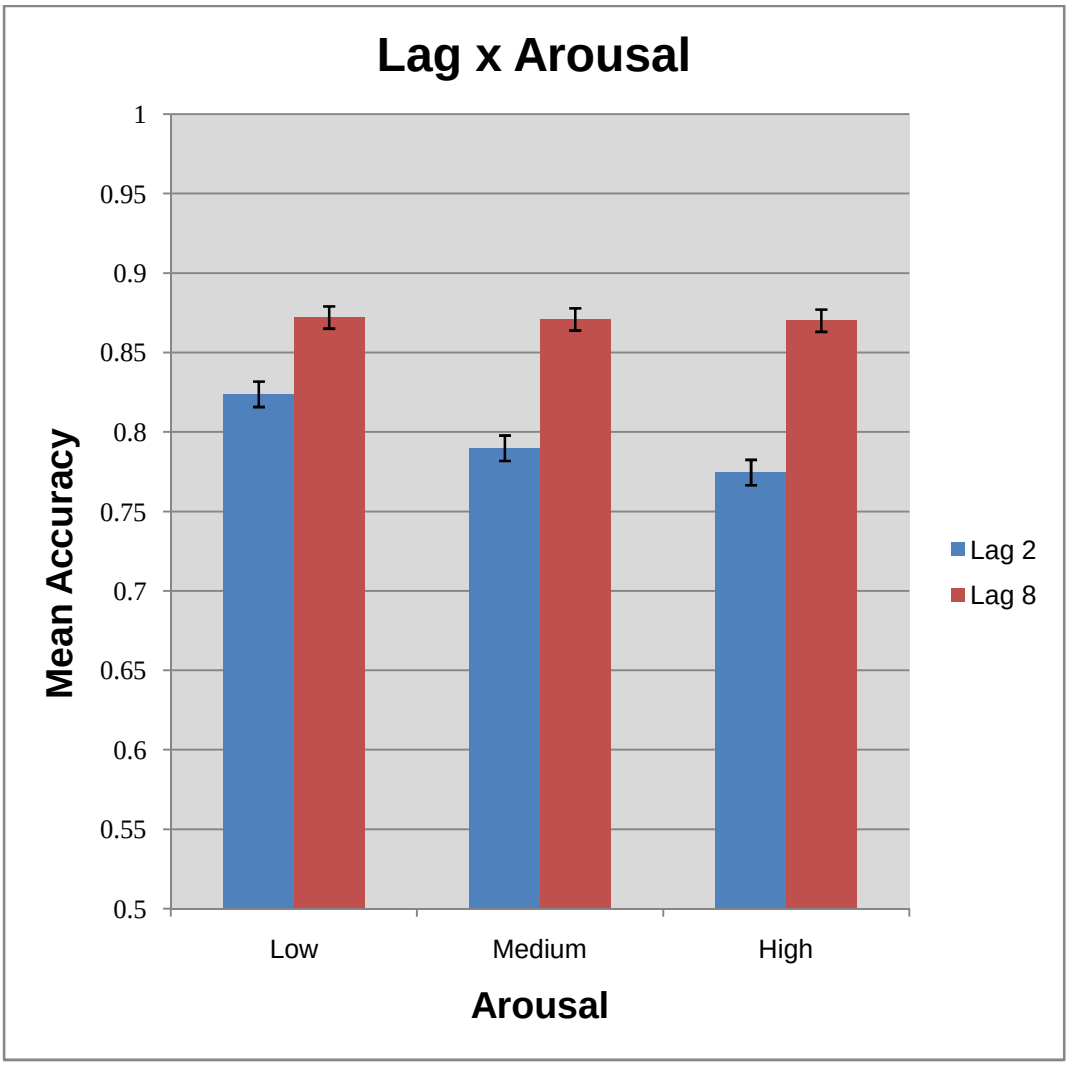

Lag x Arousal
Mean Accuracy
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0.55
0.5
Low
Medium
High
Arousal
Lag 2
Lag 8

Figure 6

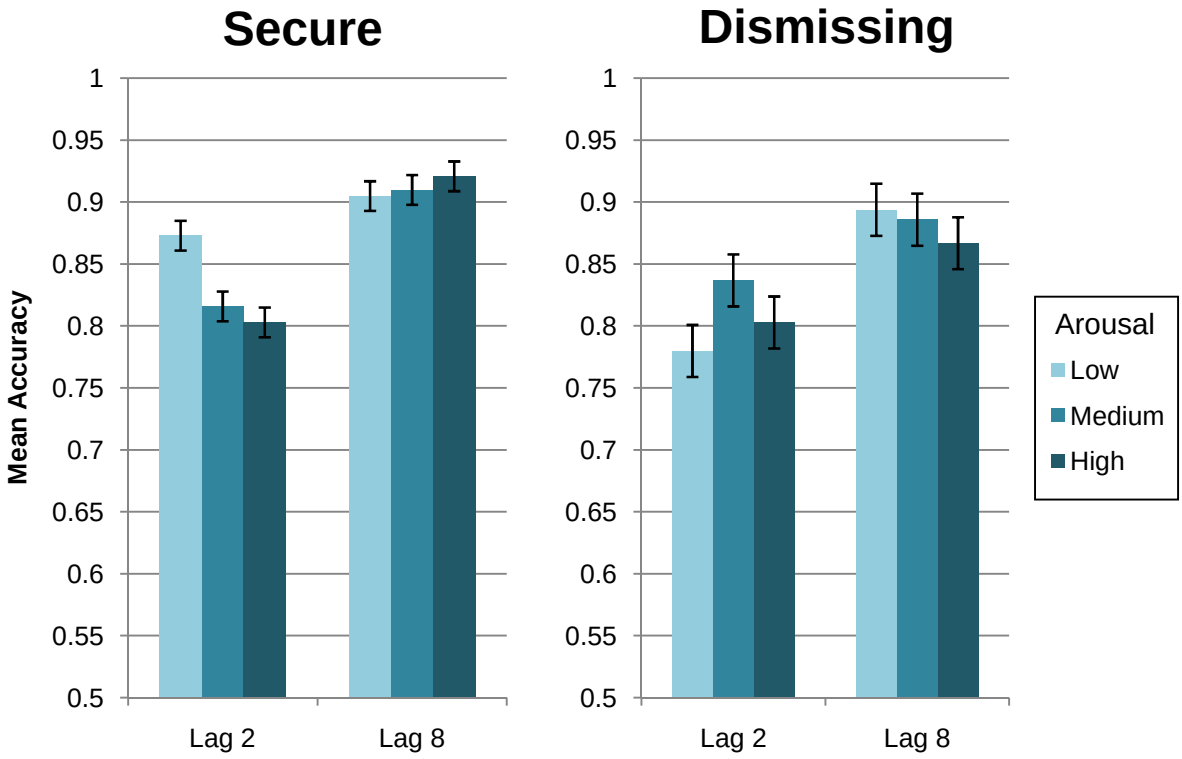
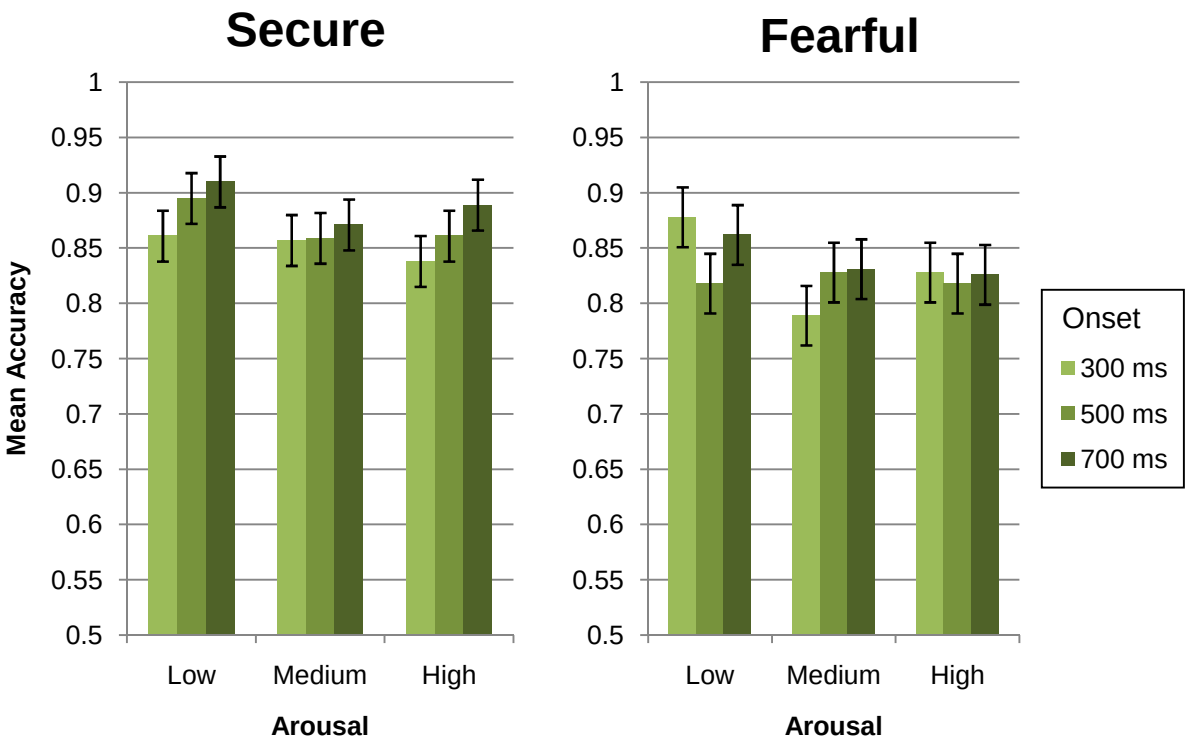

Secure
Dismissing
Mean Accuracy
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0.55
0.5
Lag 2
Lag 8
Arousal
Low
Medium
High

Figure 7


Secure
Fearful
Mean Accuracy
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0.55
0.5
Low
Medium
High
Arousal
Onset
300 ms
500 ms
700 ms